INSTRUCTIONS

FUEL PUMP RACK SETTINGS

GENERAL

The following instructions cover the fuel pump rack settings for eight-, twelve- and sixteen-cylinder engines. The settings presented in the DATA* section are for eighth notch, full load (0.344-in. governor power piston gap), and for IDLE (31/32 to 1-1/32-in. power piston gap).

The settings given in this publication will give the approximate horsepower expected from the engine; the precise horsepower output can only be achieved by load testing the engine and by fine adjustment of the control racks as required.

FUEL HEADER PRESSURE

Current-production locomotives are tested with the fuel header pressure, at IDLE, set at 39-41 psi. The rack settings given in the DATA section are for engines having this same 39-41 psi header pressure.

NOTE: *The header pressure at full speed and full load will be lower than the pressure at IDLE. This lower pressure varies with the engine horsepower output, and with the condition of the fuel strainer, fuel filter and fuel transfer pump.*

NOTE: *Starting in mid-1973, new-production locomotives were set at the factory with 39-41 psi fuel-header pressure. Older locomotives were formerly set at 22-24 psi for the large-pump system and 33-37 psi for the small-pump system. These may be reset to the universal 39-41 psi pressure, but the locomotive must be on a load box while making the change from 22-24 psi to 39-41 psi, since a correction in rack settings may be required to restore proper engine horsepower. When changing from 33-37 psi to 39-41 psi, the load box is not mandatory but is recommended.*

*The rack settings given in this publication supersede those listed in GEI-82068.

FIG. 1, E-22594

FIG. 1. CORRECT METHOD OF OBSERVING RACK READING —21+ MM READING SHOWN.

CHECKING SCHEDULE

Fuel pump racks should be serviced as follows:

1. All pump racks checked and adjusted (if required):
   a. At annual locomotive inspection
   b. Prior to load-testing the locomotive.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.

2. Individual pump racks checked and adjusted (if required):

   a. When an individual engine cylinder is replaced

   b. When an individual fuel pump is replaced.

3. Spot check pump racks after:

   a. Replacement of the engine control governor

   b. Replacement of the overspeed-derater link.

   c. Replacement of the governor drive assembly.

   If the spot check reveals any rack to be incorrectly set, then all racks on the engine should be checked and adjusted as required.

READING RACK SETTING

To correctly read a rack setting, always observe the control rack at a right angle to the direction of rack movement. Observing from an oblique angle will give an erroneous reading. Small pumps have a fuel indicator which points to the etched indications (in millimeters) on the control rack. With large pumps, the rack reading is obtained by sighting across the face of the calibration-screw head toward the etched indications (in millimeters) on the control rack (see Fig. 1).

ADJUSTING FUEL PUMP RACKS

The racks of all fuel-injection pumps on an engine must be set to match the governor power piston gap and must be identical within the limits specified in the DATA section. This is best accomplished with the engine shut down and the starting contactors blocked open (or insulated). In general, the governor power piston and the fuel linkage first must be set up to simulate a notch 8, full-load condition, after which each individual pump rack is adjusted to the correct millimeter setting. Several variables will be considered in the procedures which follow. These variables result from product design changes, field modifications, and the mixing of the various designs on the same engine.

A. Set up the governor power piston and fuel linkage by one of the following methods:

1. If engine IS EQUIPPED with an overspeed link:

   a. Install the overspeed link compressor, Part 147X1580, on the side of the governor drive gear unit (Fig. 2).

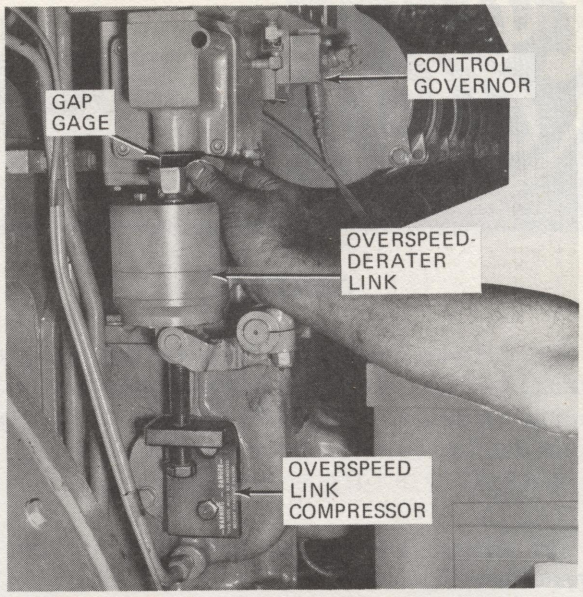

FIG. 2, E-18311A

FIG. 2. SETTING UP POWER PISTON AND FUEL LINKAGE WITH ENGINE SHUT DOWN.

   b. Turn compressor screw up to apply a force against the bottom of the overspeed-derater link to compress the link and raise the power piston. Raise the piston until the 0.344-in. gap gage, Part 147X1296, is firmly clamped and the overspeed-derater link is fully compressed. This will be evident when, on older links, the groove in the guide rod is flush with the face of the top cover; on newer links, the bottom faces of the indicator lug and outer casing must be flush; on current-production links the top of the indicator must be aligned with the lower groove on the outer casing.

NOTE: *While compressing the link, the outer casing may rise with the inner casing. If this occurs, pull the outer casing down until the retaining ring contacts the top of the top cover.*

2. If engine IS NOT EQUIPPED with an overspeed link:

   a. Install the overspeed link compressor, Part 147X1580, on the side of the governor drive gear unit (Fig. 2).

   b. Turn the compressor screw up to apply a force against the bottom of the link attached to the governor power piston rod. Raise the piston until the 0.344-in. gap gage, Part 147X1296, is firmly clamped.

NOTE: *To avoid the physical effort required to compress the link, remove the oil inlet hose from the link and supply compressed air or hydraulic fluid (max. 200 psi pressure) to the oil inlet fitting.*

FIG. 3, E-18363A

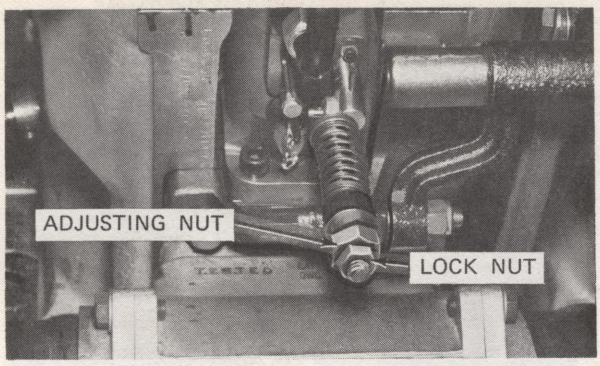

FIG. 3. FUEL PUMP RACK ADJUSTMENT — NUT AND LOCK NUT TYPE ADJUSTABLE LINK.

FIG. 4, E-18312A

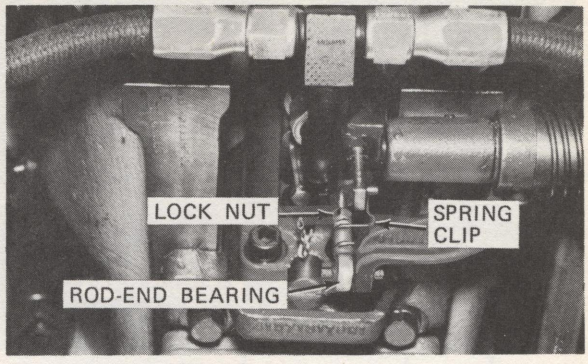

FIG. 4. FUEL PUMP RACK ADJUSTMENT — BEARING AND NUT TYPE ADJUSTABLE LINK.

B. Check the notch eight (N8) settings of all pump racks. Those racks with settings different from the values shown in the DATA section must be reset, using one of the following methods:

1. If pumps are operated by a nut and lock nut type adjustable link (Fig. 3):

   a. Using two wrenches, hold the adjusting nut and loosen the lock nut.

   b. Turn the adjusting nut to lengthen or shorten the link so the rack shows the correct millimeter setting.

   c. Using two wrenches, hold the adjusting nut and tighten the lock nut.

   d. Repeat Steps a, b and c for all pumps needing adjustment.

   e. Back off the compressor screw completely and remove the link compressor and gap gage used for this operation. Check all racks, which should now read 0 to 3 mm, the correct reading for the engine SHUTDOWN condition.

WARNING: *Under no condition should the engine be started with the overspeed link compressor still in place. This could result in destruction of the engine and injury to personnel in the vicinity.*

2. If pumps are operated by a rod-end bearing and nut type adjustable link (Fig. 4):

   a. Using two wrenches, loosen the lock nut and release the spring clip.

   b. Disengage the adjustable link, and turn the threaded portion in or out to lengthen or shorten it so the rack shows the correct millimeter setting.

   c. Reassemble the adjustable link, tighten the lock nut, and secure the spring clip.

   d. Follow the same instructions given in Steps d and e in Item B-1 above.

3. If pumps are operated by a turnbuckle type adjustable link (Fig. 5):

   a. Using two wrenches, loosen both lock nuts.

   b. Turn the hex portion of the turnbuckle to lengthen or shorten the link so the rack shows the correct millimeter setting.

   c. Using two wrenches, tighten both lock nuts.

   d. Follow the same instructions given under Steps d and e in Item B-1 above.

4. If pumps are operated by a round knurled nut type adjustable link (Fig. 6):

   a. Loosen the lock screw using a 9/64-in. hex key wrench.

   b. By hand only, turn the round knurled nut to lengthen or shorten the link so the rack shows the correct millimeter setting.

   c. Tighten the lock screw using a 9/64-in. hex key wrench.

   d. Follow the same instructions given under Steps d and e in Item B-1 above.

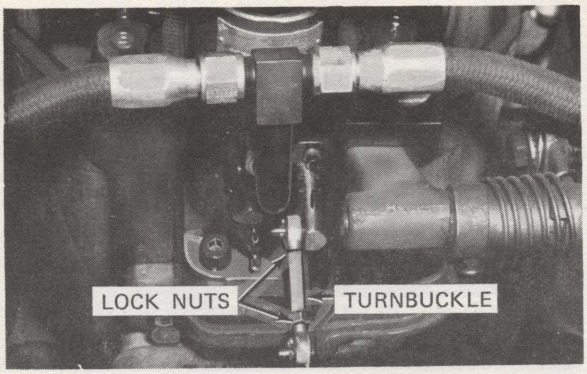

FIG. 5. FUEL PUMP RACK ADJUSTMENT — TURNBUCKLE TYPE ADJUSTABLE LINK.

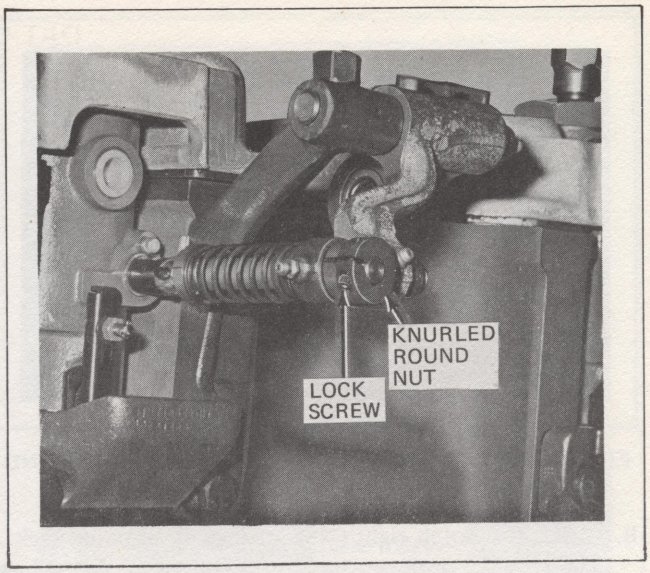

FIG. 6. FUEL PUMP RACK ADJUSTMENT — ROUND KNURLED NUT-TYPE ADJUSTABLE LINK.

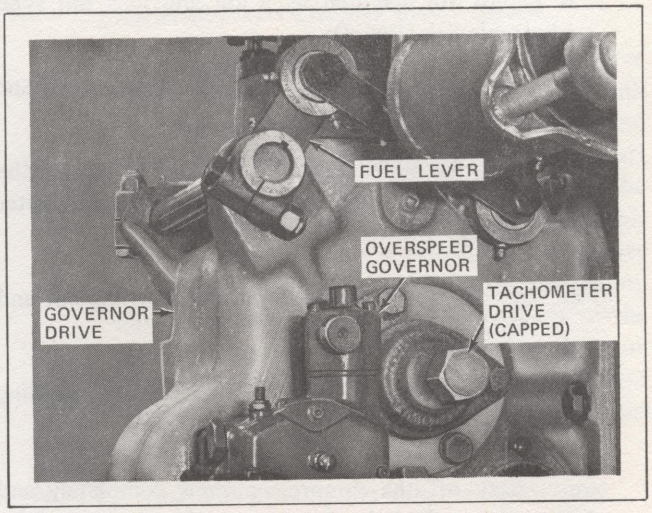

FIG. 7. FUEL LEVER.

FIG. 5, E-18314A

FIG. 6, E-25339

FIG. 7, E-22595

FUEL LINKAGE

The fuel linkage assemblies used on GE engines are, in general, quite similar and differ only in the following manner:

1. Quantities of parts (vary with number of cylinders)
2. Design of adjustable link (refer to preceding section, ADJUSTING FUEL PUMP RACKS)
3. Length of fuel lever (see Fig. 7).

The fuel lever must be of such length that it will produce BOTH the maximum-horsepower control-rack value and the idle-speed control-rack value while the governor power piston moves thru its uniform length of travel; that is, from the IDLE position when the power-piston gap is 31/32 in. to 1-1/32 in. to the FULL SPEED, FULL POWER position when the gap is 11/32 (0.344) in.

The DATA table gives the part number and center-to-center length for the fuel lever recommended for each locomotive application. Some older engines may have a fuel lever different than the one recommended but which will still give satisfactory performance.

DATA

Engine Type	Locomotive Application	Horsepower to Generator for Traction *	Notch 8 Engine Speed (RPM)	Notch 8 Tachometer Speed (RPM)	Injection Pump Size**	Fuel Lever and Length (in.)	Rack Settings (mm)	
							△Engine Hot, N8 Speed, Full Load, 0.344 in. Gap	Idle Speed, 31/32 to 1-1/32 in. Gap□
7FDL8E	U14	1400	1045-1057	1553-1568	Large	132X1106-4 (2.375)	19,50-20,00†	5,50-6,00
7FDL8C	U15	1500	1020-1033	1515-1526	Small	132X1317 (2.968)	23,00-23,50	
7FDL8E	U15	1650/1559	1045-1057	1553-1568	Large	132X1310 (2.593)	20,50-21,00	
7FDL8D	U17	1825/1700	1045-1057	1553-1568	Large	132X1276-1 (2.843)	22,25-22,75	5,50-6,00

†In U.S. practice, read this as 19.50-20.00 mm.

DATA (Cont'd.)

Engine Type	Locomotive Application	Horsepower to Generator for Traction *	Notch 8 Engine Speed (RPM)	Notch 8 Tachometer Speed (RPM)	Injection Pump Size**	Fuel Lever and Length (in.)	Rack Settings (mm)	
							△Engine Hot, N8 Speed, Full Load, 0.344 in. Gap	Idle Speed, 31/32 to 1-1/32 in. Gap□
7FDL8D	U18	1800	1045-1057	1553-1568	Large	132X1318 (3.250)	24,25-24,75†	5,50-6,00
7FDL8E	U18	1950/1820	1045-1057	1553-1568	Large	132X1318 (3.250)	23,75-24,25	
7FDL12B	U20	2000	995-1007	1479-1493	Small	132X1251-1 (2.484)	19,75-20,25	
7FDL12B	U20	2000	1020-1033	1515-1526	Small	132X1106-4 (2.375)	19,00-19,50	
7FDL12B	U20	2000	1045-1057	1553-1568	Small	132X1106-4 (2.375)	19,00-19,50	
7FDL12D	U20	2000	1045-1057	1553-1568	Large	132X1443 (2.063)	17,50-18,00	
7FDL12D	U22	2480/2325	1045-1057	1553-1568	Large	132X1106-4 (2.375)	19,25-19,75	
7FDL12	U22	2350/2200	1045-1057	1553-1568	Large	132X1344 (2.188)	18,25-18,75	
7FDL12D	U22	2285/2150	1045-1057	1553-1568	Large	132X1344 (2.188)	18,25-18,75	
7FDL12C	U23	2250	1020-1033	1515-1526	Small	132X1276-1 (2.843)	22,00-22,50	
7FDL12C	U23	2250	1045-1057	1553-1568	Small	132X1276-1 (2.843)	21,75-22,25	
7FDL12C	U23	2250	1020-1033	1515-1526	Large	132X1106-4 (2.375)	19,50-20,00	
7FDL12F	U23	2250	1045-1057	1553-1568	Large	132X1106-4 (2.375)	19,50-20,00	
7FDL12D	U23	1800	1045-1057	1553-1568	Large	132X1396 (1.968)	17,00-17,50	
7FDL12D	U26	2750/2600	1045-1057	1553-1568	Large	132X1243-2 (2.734)	21,00-21,50	
7FDL12D	U26	2610/2450	1045-1057	1553-1568	Large	132X1243-2 (2.734)	20,75-21,25	
7FDL16A	U25	2500	995-1007	1479-1493	Small	132X1106-4 (2.375)	19,25-19,75	
7FDL16C	U28	2800	995-1007	1479-1493	Small	132X1310 (2.593)	20,75-21,25	
7FDL16D	U30	3000	1020-1033	1515-1526	Small	132X1243-2 (2.734)	21,50-22,00	
7FDL16E	U30	3000	1020-1033	1515-1526	Large	132X1251-1 (2.484)	19,50-20,00	
7FDL16E	U30	3000	1045-1057	1553-1568	Large	132X1251-1 (2.484)	19,50-20,00	
7FDL16E	U33	3300	1045-1057	1553-1568	Large	132X1310 (2.593)	20,75-21,25	
7FDL16F	U34	3400	958-962	1423-1429	Large	132X1243-2 (2.734)	21,50-22,00	
7FDL16F	U36	3600	1045-1057	1553-1568	Large	132X1276-1 (2.843)	22,25-22,75	
7FDL12	B23-7	2525	1045-1057	1553-1568	Large	132X1106-4 (2.375)	19,50-20,00	
7FDL16	C30-7	3000	1045-1057	1553-1568	Large	132X1251-1 (2.848)	19,50-20,00	
7FDL16	B36-7	3600	1045-1057	1553-1568	Large	132X1251-1 (2.848)	19,50-20,00	
7FDL16	C36-7	3600	1045-1057	1553-1568	Large	132X1251-1 (2.848)	19,50-20,00	5,50-6,00

†In U.S. practice, read this as 24.25-24.75 mm.

Continued . . . .

DATA (Cont'd.)

Engine Type	Locomotive Application	Horsepower to Generator for Traction *	Notch 8 Engine Speed (RPM)	Notch 8 Tachometer Speed (RPM)	Injection Pump Size**	Fuel Lever and Length (in.)	Rack Settings (mm)	
							ΔEngine Hot, N8 Speed, Full Load, 0.344 in. Gap	Idle Speed, 31/32 to 1-1/32 in. Gap□
7FDL16F	B36-7	3600	1045-1057	1553-1568	Large	132X1276-1 (2.843)	22,25-22,75	5,50-6,00
7FDL16F	C36-7	3600	1045-1057	1553-1568	Large	132X1276-1 (2.843)	22,25-22,75	5,50-6,00
7FDL12	B30-7A	3000	1045-1057	1553-1568	Large	132X1318 (3.250)	24,25-24,75	5,50-6,00
* 7FDL16	C36-7	3600	995-1003	1478-1490	Large	132X1317 (2.968)	22,50-23,00	5,50-6,00

*The locomotive nameplate on current-production export locomotives shows two U.I.C. horsepower values. The first and larger value is the gross engine horsepower, while the second value is the net horsepower available for traction. Nameplates on domestic locomotives show only the net horsepower for traction.

**A large pump is identified as a Part 132X1254-1 (Bendix) or Part 132X1343 (Bosch) pump; a small pump as a Part 132X1198-5 or 132X1360 pump.

ΔNOTE: Experience shows that in many cases the rack readings on an engine, hot and running at full load, will average 0,5 mm higher than for the same engine cold and shut-down.

□When the engine is running at IDLE speed, power-piston gap will vary due to variance in locomotive auxiliary loads.

*Revisions are indicated by marginal bars.

NOTES: